

TO: Director, National Institute for Occupational Safety and Health

FROM: California Fatality Assessment and Control Evaluation (FACE) Program

SUBJECT: Mechanic dies when bus falls off jack stands and crushes him in California

SUMMARY
California FACE Report #99CA006

A 48-year old male mechanic (decedent) died when he was crushed by a bus that fell off jack stands. He had jacked the 37,500 pound bus up with lifts that cradle each rear tire. When the rear of the bus was lifted, the decedent placed jack stands underneath the trailing arms of the rear suspension. The jack stands were fabricated by a local welding shop. They were made with quarter-inch plate steel on the top and bottom with a square steel tube welded between. The front tires had not been chocked. As he was performing a brake job underneath the bus, the bus slipped off the jack stands. The bus crushed the decedent between the rear axle and the concrete floor. The CA/FACE investigator determined that, in order to prevent future occurrences, employers should as part of their Injury and Illness Prevention Program (IIPP):

- ensure employees use only tools and equipment that have been tested, certified and rated.
- ensure employees chock the wheels of vehicles that remain in contact with the working surface.
- ensure employees do not place jack stands on portions of a vehicle that are not fixed in place.

INTRODUCTION

On May 12, 1999 at 4:36 a.m. a 48-year old male mechanic (decedent) died when he was crushed by a bus that fell off jack stands. He was performing a brake job and was underneath the bus. When the bus slipped off the stands the bus crushed the decedent between the rear axle and the concrete floor. The CA/FACE investigator learned of this incident on May 17, 1999 from the local legal office of the California Department of Industrial Relations, Division of

Occupational Safety & Health (Cal/OSHA). On May 19, 1999 the CA/FACE investigator traveled to the incident site where he interviewed the company district manager. The CA/FACE investigator took photographs of the bus and the jack stands involved in the incident.

The employer, a public transportation company, had been in business for 45 years at time of the incident. The number of employees in the company was 79,500 with 150 employees working on site at the time of the incident. The decedent had worked for the company for 7 years at the time of the incident, 3 years of which were spent at the site. The decedent, according to the district manager, was trained and had worked at another company location as a mechanic prior to his employment at the facility where the fatality occurred. No training documents for the decedent could be located.

The company had a complete Injury and Illness Prevention Program (IIPP) and a code of safe practices as contained in the company safety manual. The district manager had primary safety responsibility and his delegates were responsible for the implementation of the IIPP. Regularly scheduled safety meetings were held once a month. Workers on the 11:00 p.m. to 7:30 a.m. shift, the decedent's shift, could come early or stay late for the safety meetings since they were held only during the two other shifts. Normally they would hold over since the subsequent shift's safety meeting was held at the beginning of the shift. The shop supervisor held safety meetings in addition to the regular meetings for the workers under his/her jurisdiction.

INVESTIGATION

The site of the incident is a large yard where transit buses are dispatched, stored and repaired. The incident occurred in a garage used to repair transit buses. The garage has a number of large bays, the length, width and height of which, will accommodate the largest single-unit transit bus.

On the day of the incident, the decedent was scheduled to perform a rear brake job on a 37,500 pound transit bus (**exhibit 1**). The bus had been backed into one of the bays. The decedent had jacked up the bus and removed the four 24 1/2 inch diameter rear wheels with their tires mounted. Normal procedure thereafter is to set the emergency brake and chock the front wheels. It is unknown if the emergency brake was set. The front wheels were not chocked.

Jack stands are used to support the bus while work is being performed. Usual parts of the undercarriage where jack stands would be placed are the frame rails and the axle housing. In this instance the decedent placed the jack stands under a moveable part of the suspension called trailing arms (**exhibit 2**). The trailing arms were 4 7/8 inches wide at the point of placement.

The jack stands the decedent used were shop-made by a local welding company. According to the district manager, they were brought on site by a mechanic that no longer works for the bus company. In addition, he stated that they were apparently made to the specifications of another bus company.

The jack stands (**exhibits 3 and 4**) used were 13 1/2 inches high. They were constructed by welding a 7 1/2 inch square piece of 1/4-inch plate steel to the top of a piece of square tubing. The square tubing served as the support post. A 12-inch by 11-inch piece of 1/4-inch plate steel had been welded to the bottom of the square tubing. The top plate was completely flat, having

no lip unlike commercial jack stands that always do.

The decedent's job was to remove the 19-inch diameter brake drum assembly. At the time of the incident he was using hand tools to perform this task. As he was under the bus, the jack stands tipped and the bus suddenly shifted sideways to the right. It fell off the jack stands and the rear axle pinned the decedent between itself and the concrete floor.

Another mechanic was sitting at a desk a short distance away doing paperwork. He heard a loud noise and looked up to see that the bus had fallen off the jack stands. He noted the decedent was pinned underneath the bus. He immediately ran to the dispatch office and called 911.

The dispatcher also heard the loud noise and ran to see what had happened. A third employee also ran over to the area of the fallen bus. The employees placed a hydraulic jack on one side of the bus and lifted it off the decedent. As they were making the rescue safer by stabilizing the bus, the paramedics arrived and helped in the rescue.

The paramedics were dispatched at 3:45 a.m. and arrived at 3:53 a.m. They found the decedent unconscious. He was transported to a local hospital where he was pronounced dead at 4:36 a.m.

CAUSE OF DEATH

The certificate of death stated the cause of death to be blunt abdominal and pelvic injuries.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should ensure employees use only tools and equipment that have been tested, certified and rated.

Discussion: The jack stands used in this instance had not been tested or certified as to their rated capacity. They were not permanently marked with a rated capacity. Their construction was not in accordance with commercial jack stand construction. Lips are employed on jack stands to cradle the area being supported. The missing lips meant that the jack stand's center of support could not be determined because the part of the vehicle being supported could not be cradled. When the part being supported is cradled equally between the lips of a jack stand, it is placed so the weight has been placed over the center of the jack stand. This makes it very difficult for the jack stand to tip. In addition, using a flat plate on the bottom of a jack stand, as in this case, does not allow for the possibility of an uneven surface. Commercially made jack stands have legs, normally constructed in a tripod fashion. Tripod jack stands are able to compensate for small surface imperfections or make larger surface imperfections readily apparent. Their legs make an uneven surface apparent by one, or two, legs not touching the surface. If the decedent had used the commercial jack stands available in the shop, placed them correctly, or if the employer had removed the shop-made jack stands from service, this incident may not have happened.

Recommendation #2: Employers should ensure employees chock the wheels of vehicles that remain in contact with the working surface.

Discussion: The decedent failed to follow shop policy and chock the wheels of the bus prior to beginning the brake job. Chocks keep vehicles from moving while parked. In this case, chocks placed under the front wheels may have prevented the front wheels from shifting when the jack stands shifted slightly. Enough movement may have been prevented to keep the bus from falling off the jack stands.

Recommendation #3: Employers should ensure employees do not place jack stands on portions of a vehicle that are not fixed in place.

Discussion: In this fatality, the decedent placed the jack stands under the trailing arms of the rear suspension. Although trailing arms are meant to move up and down, they do have some sideways movement. Jack stands are normally placed under the frame rail, axle housing, or another fixed area capable of supporting the weight of a vehicle. Both the frame rail, 3 1/2 inches wide, and the axle housing were available for jack stand placement in this instance. To do this, the decedent would have had to use the available commercial jack stands since the shop-made stands would not work. If the decedent had placed the proper jack stands under fixed parts of the undercarriage, this incident may not have happened.

References:

Barclays Official California Code of Regulations, Vol. 9, Title 8, Industrial Relations, South San Francisco, 1998

For general information regarding vehicle repair shops refer to:

<http://www.dir.ca.gov/title8/3562.html>; [3319.html](http://www.dir.ca.gov/title8/3319.html); [3325-3328.html](http://www.dir.ca.gov/title8/3325-3328.html); [3540-3549.html](http://www.dir.ca.gov/title8/3540-3549.html). These safety orders may not specifically apply to this incident, but may be helpful in preventing future incidents.

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August 27, 1999

FATALITY ASSESSMENT AND CONTROL EVALUATION PROGRAM

The California Department of Health Services, in cooperation with the California Public Health Institute, and the National Institute for Occupational Safety and Health (NIOSH), conducts investigations on work-related fatalities. The goal of this program, known as the California Fatality Assessment and Control Evaluation (CA/FACE), is to prevent fatal work injuries in the future. CA/FACE aims to achieve this goal by studying the work environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in fatal injury, and the role of management in controlling how these factors interact.

NIOSH funded state-based FACE programs include: Alaska, California, Iowa, Kentucky, Maryland, Massachusetts, Maryland, Minnesota, Missouri, Nebraska, New Jersey, Ohio, Oklahoma, Texas, Washington, West Virginia, and Wisconsin.

Additional information regarding the CA/FACE program is available from:

**California FACE Program
California Department of Health Services
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